

# A New Species of *Rhinebothrium* (Cestoda: Tetrphyllidea) and Redescription of Three Rhinebothriate Species from the Round Stingray, *Urolophus halleri* Cooper in Southern California

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*Abstract.*—A new species of *Rhinebothrium* (Tetrphyllidea: Phyllobothriidae) is described from the spiral valve of three round stingrays, *Urolophus halleri* Cooper, collected in Anaheim Bay, Seal Beach, California. Redescriptions of *R. urobatidium* (Young, 1955) n. comb., *R. bilobatum* (Young, 1955) n. comb. and *Caulobothrium multorchidum* (Young, 1954) n. comb. are made from material available in the USNM Helminthological Collection and new material from the type host. The validity of generic characteristics is discussed and generic evaluations of *Rhinebothrium* Linton, 1890, *Caulobothrium* Baer, 1948, and *Rhabdotobothrium* Euzet, 1953, are emended.

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Young (1954, 1955), reported and described several species of *echeneibothrium* Beneden, 1849, from *Urolophus halleri* Cooper (= *Urobatis halleri*) in Southern California. Williams (1966) noted some of Young's species as erroneously allocated to *Echeneibothrium*, and both Campbell (1970) and Cornford (1974) indicated confusion in their generic allocations. This report is aimed at substantiating the taxonomic status of some of these species, and emending the generic evaluations of *Rhinebothrium* (Linton, 1890) Baer, 1948, *Caulobothrium* Baer, 1948, and *Rhabdotobothrium* Euzet, 1953, to include recently described generic variability.

During August and September, 1973, four round stingrays, *Urolophus halleri* Cooper, collected in Anaheim Bay, Seal Beach, California were found to be infected with two previously described and one new species of rhinebothriate cestodes. Specimens were removed from the spiral valves, observed, then fixed in hot AFA. Whole mounts were stained in celestine blue B or Semichron's carmine, dehydrated in ethanol, cleared in xylene and mounted in Permount. Paraffin sections were cut at 8 and 10 $\mu$  and stained in Delafield's hematoxylin and eosin. All figures were drawn with the aid of a drawing tube and represent material collected in this study. Average measurements and standard deviations of measured items are given with ranges and sample size (N=), in parentheses. Redescriptions of *R. urobatidium* (Young, 1955) n. comb., *R. bilobatum* (Young, 1955) n. comb. and *Caulobothrium multorchidum* (Young, 1954) n. comb., were made from type material available in the USNM Helminthological Collection and specimens found in the present study. All measurements are in microns unless otherwise stated.

*Rhinebothrium urobatidium* (Young, 1955) n. comb.  
(*Echeneibothrium urobatidium* Young, 1955)

Fig. 1

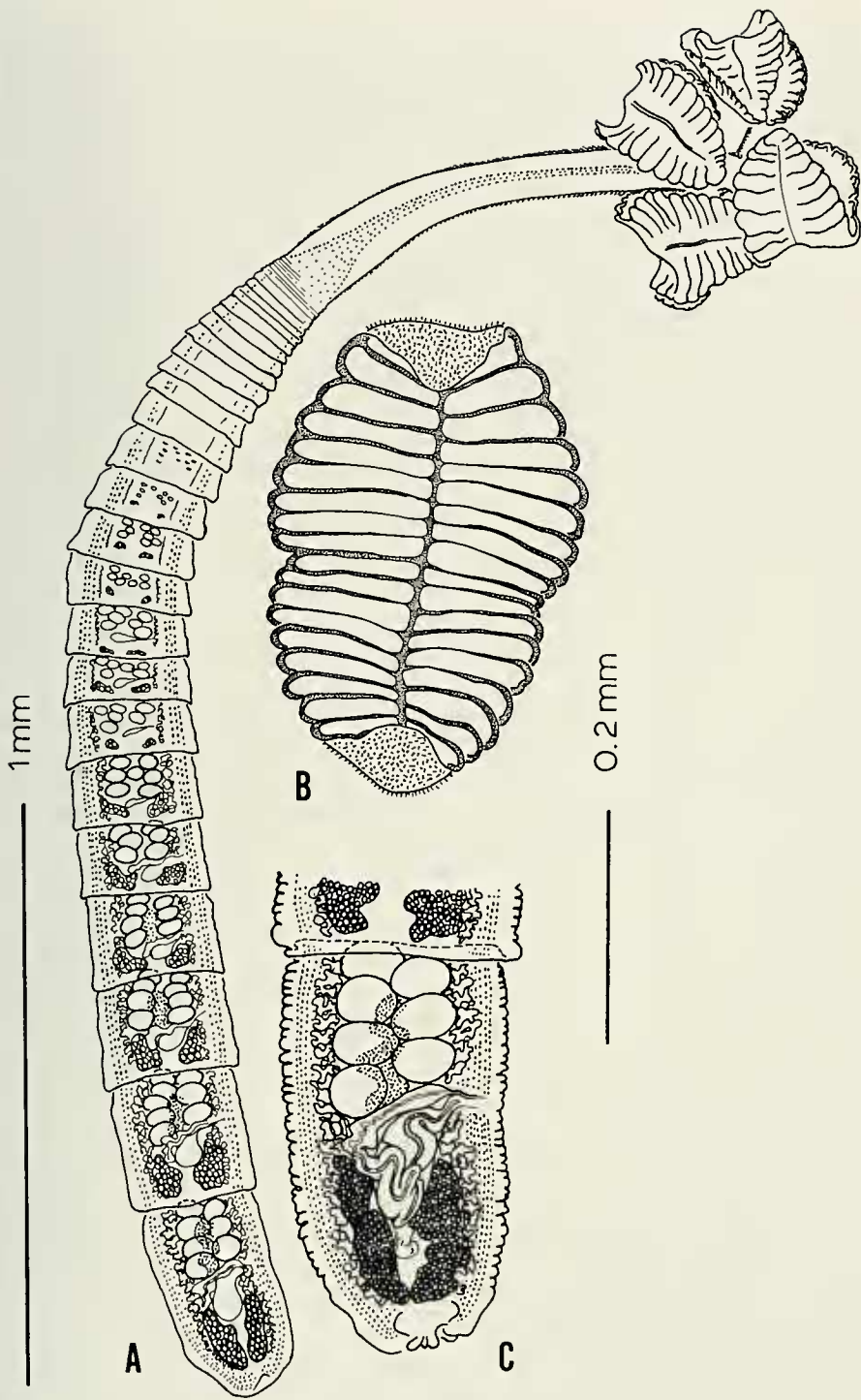


Fig. 1. *Rhinebothrium urobatidium* (Young, 1955) n. comb.: A. Entire worm; B. Bothridium; C. Terminal mature proglottid.

The following description is based on ten specimens: one, of two specimens present on Young's (1955) type slide, and nine complete specimens (three mature, six immature) found in three type host individuals from Anaheim Bay. Since neither specimen on Young's type slide is designated as the holotype, the larger and more mature of these is hereby designated as lectotype.

Phyllobothriidae: Mature individuals, small craspedote worms, (N = 3) 3.3 (3.1 to 3.4) mm long by 256 (242 to 283) wide (lectotype 7.5 mm by 296); number of segments 30 to 41 (N = 3) (lectotype 58); four bothridia borne on pedicels, 91 (67 to 128) long by 68 (47 to 81) wide (N = 7) (lectotype 117 to 167 by 61 to 74); bothridial margin slightly lobulated; peduncle 550 (478 to 660) long by 101 (87 to 114) wide (N = 3) (lectotype 996 by 141); bothridia 401 (363 to 451) long by 195 (188 to 215) wide (N = 5) (lectotype 243 to 301 by 227 to 291), and divided by one longitudinal and 19 to 21 (lectotype 22) transverse septa (N = 5) into 38 to 42 (3 worms, N = 5) (lectotype 44) weak loculi; rostellum absent; terminal segment longer than wide, 435 (357 to 573) long by 219 (210 to 227) wide (N = 3) (lectotype 267 to 428 by 207 to 448); cirrus pouch lateral, extending posteriorly into medullary region in more mature proglottids, 87 (58 to 129) long by 56 (43 to 77) wide (N = 7) (lectotype 70 to 150 by 24 to 60); testes subspherical, 6 to 12 in number (N = 26) (6 to 9 in lectotype), located anterior to cirrus pouch and measuring 48 (37 to 67) long by 49 (27 to 80) wide (N = 9) (lectotype 25 to 62 by 32 to 79); Cirrus spined; genital pore in posterior half of segment in mature proglottids; genital atrium absent; ovary restricted to posterior one-third of proglottid, lobes 108 (60 to 247) long by 51 (35 to 75) wide (N = 16) (lectotype 25 to 62 by 32 to 79); ovary X-shaped in transverse section (tetralobate); vitellaria compact, extending in lateral bands entire length of proglottid; spines present on peduncle and pedicels; peduncle spines 5 long, diminishing in size at area of strobilization; pedicel spines approximately 3 long.

Immature worms (those showing only some testis development), are 1.9 (1.2 to 2.5) mm long by 146 (121 to 175) wide (N = 6); number of segments 22 (16 to 24) (N = 6); peduncle 339 (87 to 606) long by 82 (74 to 101) wide (N = 6), spined; bothridia 437 (337 to 538) long by 190 (155 to 276) wide (N = 13), and divided by one longitudinal and 19 to 23 transverse septa into 38 to 46 weak loculi (N = 15); rostellum absent; testes subspherical, varying in number from 7 to 12 (N = 33), located anterior to cirrus pouch and measuring 16 (10 to 23) long by 27 (13 to 45) (N = 7) wide.

One mature and one immature specimen have been deposited in the USNM Helminthological Collection.

Type host: *Urolophus halleri* Cooper (= *Urobatris halleri*).

Location: Spiral valve.

Locality: San Diego Bay, California; Anaheim Bay, California.

Type specimens: Lectotype and paralectotype USNM Coll. No. 49097 and referred specimens No. 74599.

*Remarks.*—Young's original description (1955) of five individuals of *R. urobatidium* neglected to include measurements of the length and width of the total worm, pedicels, bothridia, cirrus pouch, testes and ovary. Young also described 10 to 12 testes while his figure depicts only seven. Measurements of mature proglottids do not fit measurements taken from the type material and, in addition, spines present on the peduncle and pedicels were not mentioned.

While the mature specimens examined in this study were similar to the type

material, several discrepancies were noted: total length (3.1 to 3.4 vs. 7.5 mm), number of proglottids (30 to 41 vs. 58), number of testes (6 to 12 vs. 6 to 9), and number of loculi in each bothridium (38 to 42 vs. 44). The present material appears less mature than the type specimen which may explain the smaller size and fewer segments. The range in number of loculi in each bothridium is more likely due to an error in counting than to natural variation as septa are weak and bothridia usually somewhat crumpled. The range in the number of testes, while greater than the type specimen, corresponds to Young's (1955) original description (10 to 12). Immature specimens, while proportionately smaller in most respects, show bothridial measurements and loculi counts that are similar to those of the more mature worms. Spines present on the peduncle and pedicels, and the craspedote nature of proglottids of all individuals help distinguish this species. The validity of *E. urobatidium* is not questioned; however, its placement in the genus *Echeneibothrium* warrants change since all members of the genus possess a rostellum. The authors therefore designate the type specimen as *Rhinebothrium urobatidium* (Young, 1955) n. comb. in keeping with its nonrostellate nature, and absence of testes between the cirrus pouch and the ovary on the poral side of the proglottid.

*Rhinebothrium bilobatum* (Young, 1955) n. comb.  
(*Echeneibothrium bilobatum* Young, 1955)

The following description is based on a single, badly fractured holotype (only specimen) in the USNM Helminthological Collection.

Phyllobothriidae: Small worm, 2.7 mm (measurement taken from Young's, 1955, figure) in total length; bilobed bothridia borne on pedicels; pedicels 131 and 139 long by 60 and 70 wide; peduncle 153 long by 99 wide; both pedicels and peduncle without spines; rostellum absent; genital atrium not visible.

Type host: *Urolophus halleri* Cooper (= *Urobatis halleri*).

Location: Spiral valve.

Locality: San Diego Bay, San Diego, California.

Type specimen: Holotype USNM Helm. Coll. No. 45976.

*Remarks*.—Young's description (1955), based on a single immature worm, appears valid. The description neglects, however, the presence or absence of spines. In addition, the lack of a definitive "neck" (=peduncle), noted by Young (1955), is difficult to confirm due to overstaining of the holotype. It appears that a short peduncle may be present. The absence of a rostellum in this species warrants the new generic designation *Rhinebothrium bilobatum* (Young, 1955) n. comb. Euzet and Carvajal (1973) previously regarded this species as belonging to the genus *Rhinebothrium*.

*Caulobothrium multorchidum* (Young, 1954) n. comb.  
(*Echeneibothrium multorchidum* Young, 1954)

Fig. 2

The following description is based on material available in USNM Helminthological Collection, and one additional specimen found in *U. halleri* from Anaheim Bay. Two specimens are present on Young's (1955) type slide; the larger was designated by him as holotype and is used in this description.

Phyllobothriidae: Small acraspedote worm, 2.6 mm long by 162 wide (holotype

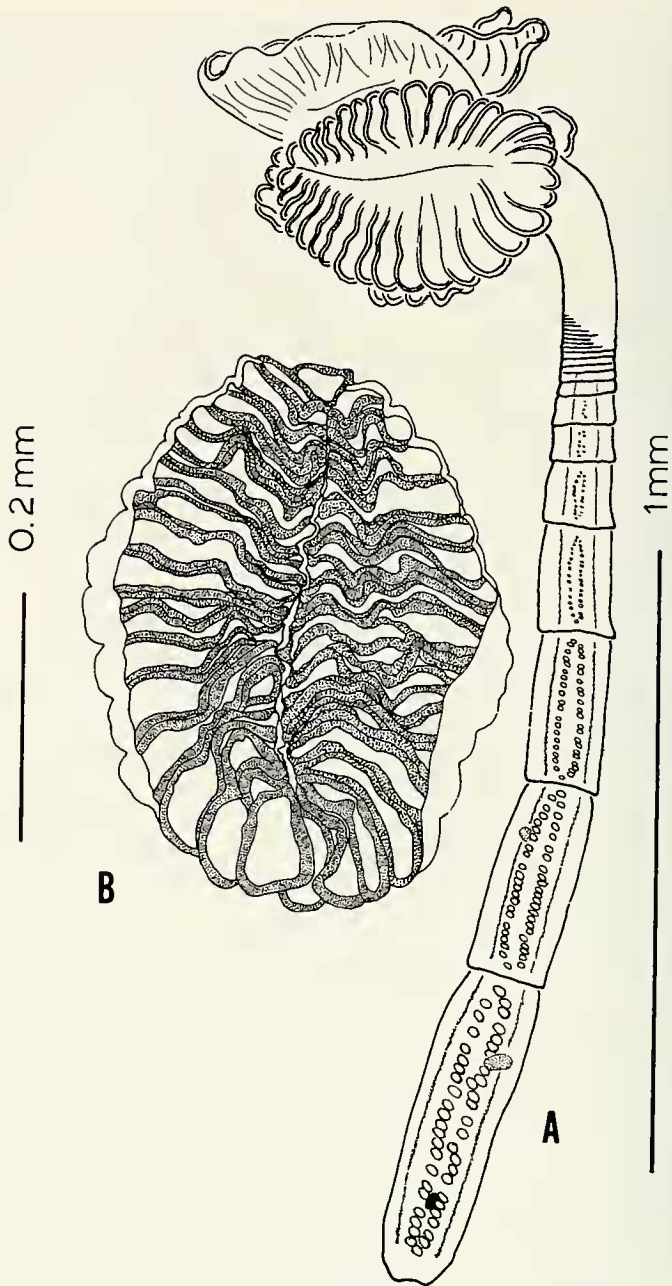


Fig. 2. *Caulobothrium multorchidum* (Young, 1955) n. comb.: A. Entire worm; B. Bothridium.

3.9 mm by 215); number of segments 11 (holotype 18); scolex with four pedicelated bothridia; pedicels approximately 81 long by 121 wide (holotype 170 by 97); peduncle aspinose, 404 long by 94 wide (holotype 578 by 114); bothridia 513 (485 to 565) long by 370 wide (holotype 518 to 591 by 237 to 324); each bothridium divided longitudinally by a single median septum and transversely by 19 (holotype 20) septa forming 2 parallel rows of 18 loculi (holotype 19) with a single unpaired

loculus at both ends of each bothridium; total number of loculi per bothridium 38 (holotype 40); rostellum absent; mature segments longer than wide, 534 long by 160 wide (holotype 234 to 418 by 207 to 217); cirrus pouch lateral, poorly visible; genital pore in anterior half of segment, alternating irregularly; genital atrium (?); testes located in lateral fields from anterior to posterior margins of proglottid, 42 to 48 in number (holotype 51 to 62); testes oblong to subspherical in shape 20 (17 to 23) long by 31 (22 to 38) wide (holotype 12 to 42 by 17 to 50); ovary faintly visible; vitellaria in indistinct lateral bands extending total length of proglottid.

Type host: *Urolophus halleri* Cooper (= *Urobatis halleri*).

Location: Spiral valve.

Locality: San Diego Bay, San Diego, California.

Type specimen: Holotype USNM Helm. Coll. No. 45976, referred specimen No. 74598.

*Remarks.*—Young's (1954) original description of *E. multorchidum* failed to include the total length of the worm, and the presence or absence of a rostellum; testes are enumerated ambiguously as 30 to 45 while 58 are depicted in the figure (a single mature worm from this study shows 48 and 42 testes in the two terminal proglottids). The absence of a rostellum and the presence of testes between the ovary and the cirrus pouch on the oral side in these specimens dictates their placement in the genus *Caulobothrium*. The form is therefore redescribed as *C. multorchidum* (Young, 1954) n. comb. Cornford (1974) listed *E. multorchidum* Young, 1954, as a possible species of *Rhinebothrium*. This suggestion was no doubt based on Young's (1954) description rather than the type material. *Caulobothrium multorchidum* resembles *C. opisthorchis* Riser, 1955, and *C. myliobatidis* Carvajal, 1977, in having testes distributed posterior to the ovary. It differs from *C. myliobatidis* in having a fewer number of loculi (38 to 40 vs. 54 to 58), and smaller bothridia (485 to 565 vs. 760 to 1,100). It differs from *C. opisthorchis* only in being smaller (2.6 to 3.9 mm vs. less than 15 mm), having fewer testes (42 to 62 vs. 78 to 90) and a shorter peduncle (404 to 578 vs. 1,120). Dissimilarities between *C. multorchidum* and *C. opisthorchis* may be due to total size, and further study may dictate their synonymy. In describing *C. opisthorchis*, Riser (1955) noted its dissimilarity to other members of the genus in having testes posterior to the ovary, suggesting the possibility of erecting a new genus. He evidently did not recognize Young's (1954) description of *E. multorchidum* as having a similar testicular distribution.

*Rhinebothrium ditesticulum* n. sp.

Fig. 3

The following description is based on 18 specimens from two hosts (17 from one; one, non-strobilate individual from another).

Phyllobothriidae: Craspedote, apolytic, medium sized worms,  $20.7 \pm 5.5$  (9.6 to 28.7) mm long (N = 17), by  $812 \pm 130$  (577 to 1,143) wide (N = 17); strobila cylindrical, number of segments  $229 \pm 35$  (160 to 276) (N = 17); scolex with four, pedicellated, bilobed bothridia; peduncle long, terminating abruptly at area of strobilization; neck absent; pedicels  $693 \pm 218$  (155 to 1,030) long (N = 63); peduncle  $9.4 \pm 2.0$  (4.9 to 12.6) mm long (N = 17), by  $312 \pm 58$  (237 to 443) wide (N = 17); bothridia  $1.8 \pm 0.2$  (1.4 to 2.2) mm long (N = 49); bothridial lobes of unequal size, completely separate, hinged at pedicel, distal lobe  $1,043 \pm 92$  (793 to

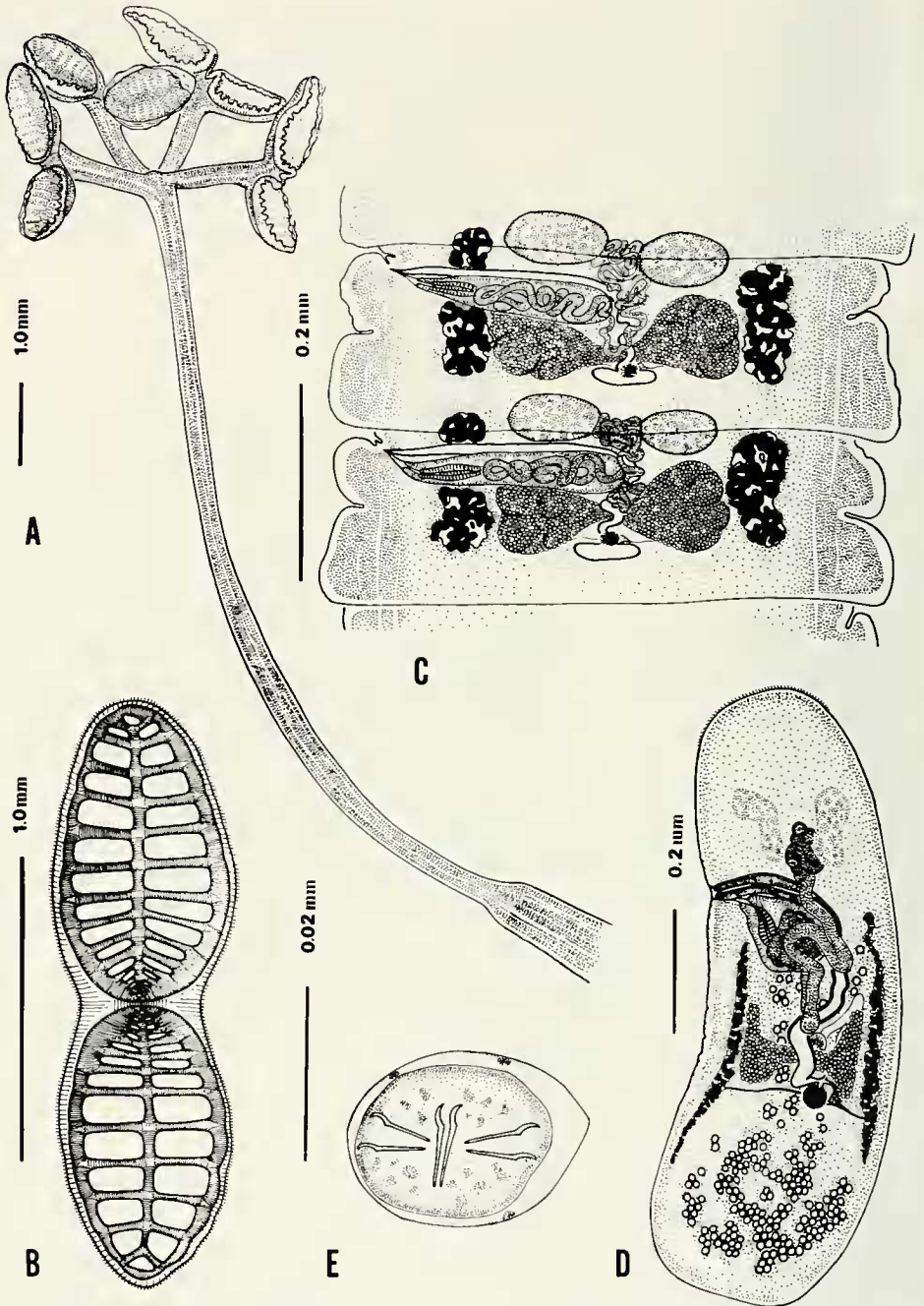


Fig. 3. *Rhinebothrium ditesticulum* n. sp.: A. Scolex; B. Bothridium (diagrammatic); C. Mature proglottids; D. Gravid proglottid; E. Egg.

1,308) long (N = 59), by  $578 \pm 85$  (433 to 731) wide (N = 23); proximal lobe  $854 \pm 78$  (690 to 1,020) long (N = 55), by  $496 \pm 64$  (422 to 639) wide (N = 17); lobes divided longitudinally by a single median septum and transversely by 12 to 14

septa in distal lobes ( $N = 34$ ), and 12 to 13 septa in proximal lobes ( $N = 32$ ), forming 2 parallel rows of 11 to 13 and 11 to 12 loculi respectively; a single unpaired loculus at each of both lobes (in slightly curled lobes terminal loculi are difficult to see); total number of loculi per bothridium (17 worms, 30 bothridia) 50 (48 to 54); rostellum absent; pedicels, peduncle and back surfaces of bothridia spinose; spines approximately 3 long; mature segments, except terminal proglottid, wider than long,  $222 \pm 62$  (80 to 347) long ( $N = 40$ ), by  $502 \pm 105$  (344 to 691) wide ( $N = 40$ ); terminal proglottids longer than wide,  $415 \pm 127$  (273 to 640) long ( $N = 14$ ), by  $377 \pm 82$  (239 to 507) wide ( $N = 14$ ); cirrus pouch lateral, extending to middle of proglottid, oblong in mature and terminal segments,  $163 \pm 28$  (104 to 204) long ( $N = 18$ ), by  $64 \pm 20$  (32 to 95) wide ( $N = 18$ ); cirrus armed, spines approximately 4 long; genital atrium absent; genital pore in anterior half of segment, alternating irregularly; testes large oblong to subspherical  $68 \pm 6$  (39 to 94) long ( $N = 22$ ), by  $117 \pm 25$  (65 to 169) wide ( $N = 22$ ), 2 per segment, opposite, located anterior to or slightly overlapping cirrus pouch, atrophied in terminal gravid proglottids; ovarian lobes equal, extending to middle or posterior border of cirrus pouch; lobes club-shaped in mature segments becoming more elongate in terminal proglottids, X-shaped in transverse section (tetralobate)  $125 \pm 57$  (29 to 226) long ( $N = 24$ ), by  $93 \pm 32$  (42 to 124) wide ( $N = 24$ ); vitellaria in dense lateral bands  $148 \pm 73$  (47 to 312) long ( $N = 22$ ) by  $52 \pm 22$  (18 to 86) wide ( $N = 22$ ); vitellaria does not encroach laterally on medullary parenchyma; longitudinal musculature of parenchyma well-developed.

Gravid free segments  $988 \pm 80$  (905 to 1,089) long ( $N = 6$ ) by  $394 \pm 70$  (338 to 533) wide ( $N = 6$ ); cirrus pouch lateral, anterior to ovary,  $156 \pm 14$  (130 to 177) long ( $N = 6$ ) by  $109 \pm 18$  (88 to 140) wide ( $N = 6$ ); ovarian lobes elongate  $234 \pm 85$  (114 to 291) long ( $N = 6$ ) by  $85 \pm 16$  (62 to 96) wide ( $N = 6$ ); uterus distended into oblong sac from posterior of proglottid to just anterior of genital pore; anterior margin of proglottid covered with minute spines; eggs subspherical to spherical  $27 \pm 1$  (25 to 29) long ( $N = 20$ ) by  $21 \pm 1$  (20 to 23) wide ( $N = 20$ ), without filaments (eggs measured in-utero only); onchosphere hooks approximately 9 long by 1 wide, handle and blade measured 6 and 3 long, respectively.

A single immature individual from a second host measured 6.6 mm long (unsegmented strobila 3.5 mm long by 446 wide). Other features as in adult.

Type host: *Urolophus halleri* Cooper, round stingray.

Location: Spiral valve.

Locality: Anaheim Bay, Seal Beach, California.

Holotype and paratype: USNM Helm. Coll. No. 73100. 73101.

*Remarks.*—Six echeneibothriate species have been reported by Young (1954, 1955) from *U. halleri* in southern California: *E. flexile* (Linton, 1890) = *Rhinebothrium flexile* Baer, 1948; *E. tumidulum* (Rudolphi, 1819) = *R. tumidulum* Euzet, 1956; *E. minimum* (Beneden, 1850) = *R. minimum* Euzet, 1956; *E. multorchidium* (Young, 1954) = *Caulobothrium multorchidium* n. comb.; *E. urobatidium* (Young, 1955) = *R. urobatidium* n. comb.; *E. bilobatum* (Young, 1955) = *R. bilobatum* n. comb. *Rhinebothrium ditesticulum* closely resembles *R. flexile* in the separation of bothridial lobes and the long, distinct peduncle; it can be distinguished, however, by the number of testes (2 vs. 14 to 18) and the number of loculi per bothridium (50 vs. 46). *Rhinebothrium tumidulum*, *R. minimum*, *R. urobatidium* n. comb., and *C. multorchidium* n. comb. lack distinct bothridia pres-



ent in *R. ditesticulum* n. sp.; while *R. bilobatum* n. comb. is much smaller (2.7 vs. 20.7 mm), and has a greater number of testes (6 vs. 2). In comparing those rhinebothriate species not from the type locality, *R. ditesticulum* n. sp. closely resembles the larval form of *E. bifidum* Yamaguti, 1952, from *Trachurus trachurus* in Japan, and *R. hawaiiensis* Cornford, 1974, in possessing completely bilobed bothridia; but is distinguished from the former by the number of longitudinal septa per bothridium (1 vs. 2), and, from the latter, in size (20.7 mm vs. 2.1 mm) and number of testes (2 vs. 11 to 13). *Rhinebothrium ditesticulum* can be distinguished from all species of *Rhinebothrium*, except *R. spinicephalum* Campbell, 1970, *R. rhinobati* Dailey and Carvajal, 1976, and *R. tetralobatum* Brooks, 1977, in having only two testes. It differs from *R. spinicephalum* and *R. rhinobati* in greater size (20.7 mm vs. 3.9 and 2.4 mm long), greater number of locules (48 to 54 vs. 32 to 34 and 23), completely distinct bothridial lobes and number of proglottids (229 vs. 44 and 24). In addition, *R. rhinobati* has unequal ovarian lobes, a large genital atrium, is acraspedote and has a very short peduncle. *Rhinebothrium ditesticulum* can be distinguished from *R. tetralobatum* in having a greater number of segments (299 vs. 82 to 100), a long spinose peduncle (9.4 mm vs. 0.96 to 0.144 mm), and in having only a single, paired ovarian lobe visible in dorsoventral view.

*Rhinebothrium ditesticulum* is very similar to *Caulobothrium tetrascaphium* Riser, 1955, in bothridial morphology, the long peduncle and the developed, longitudinal musculature of the parenchyma. It differs in lacking testes between the ovary and the cirrus pouch on the poral side.

### Discussion

The validity of *Rhinebothrium* has been disputed since Linton's description in 1890. Wardle and McLeod (1952), Young (1956), Yamaguti (1959) and Alexander (1963) considered this genus a synonym of *Echeneibothrium* Beneden, 1850. In contrast, Williams (1958, 1966), Euzet (1953, 1954, 1956), Baer (1961), Campbell (1970, 1975), Euzet and Carvajal (1973), Cornford (1974), Dailey and Carvajal (1976), Brooks and Thorson (1976) and Brooks (1977) presented *Rhinebothrium* as distinct from *Echeneibothrium* in lacking a rostellum. The finding of three populations, totalling 53 scoleces, all lacking rostella, even in a non-strobiliated individual, appears to substantiate the stability of the character.

Since species of *Echeneibothrium* are restricted to hosts of the superfamily Rajoidea (skates), and, at least in the Northern Hemisphere (Euzet and Carvajal, 1973; Dailey and Carvajal, 1976, have found *Rhinebothrium* from Rajoidea and Rhinobatoidea respectively in Chilean waters), *Rhinebothrium* is restricted to Myliobatoidea (stingrays) (Williams, 1966, Campbell, 1970, 1975), it seems possible that all the species reported by Young (1954, 1955) from *U. halleri* (Myliobatoidea) are probably either *Rhinebothrium* or *Caulobothrium*. This possibility becomes more evident with the knowledge that Young (1954, 1955) did not recognize either of these genera at the time he described the three new species of *Echeneibothrium* here redescribed as species of *Rhinebothrium* and *Caulobothrium*. In addition, *E. minimum*, *E. tumidulum* and *E. flexile*, reported by Young (1954, 1955), have all been established as species of *Rhinebothrium* (Baer, 1948, Euzet, 1959), though none of these species were found in this study. Riser's (1955)

descriptions of three new species of *Echeneibothrium* from skates in the eastern Pacific help to confirm the local host group specificity of these genera.

Recent descriptions of species of *Rhinebothrium* (Linton, 1890, Baer, 1948), *Caulobothrium* (Baer, 1948, Euzet, 1953) and *Rhabdotobothrium* (Euzet, 1953) have neglected to or erroneously emended generic evaluations. Campbell (1970) emended the generic description of *Rhinebothrium* by stating "Posterior portion of scolex modified into a peduncle. . . ." This is in contrast with earlier evaluations which indicated a peduncle may be present or absent (Baer, 1948, Euzet, 1953, 1956). *Rhinebothrium minimum* (VanBeneden, 1850) Euzet, 1954, *R. tumidulum* (Rudolphi, 1819) Euzet, 1953, and *R. moralarii* Brooks and Thorson, 1976, would not be included in Campbell's evaluation. Descriptions of new *Caulobothrium* species by Carvajal (1977) and Brooks (1977), also indicated departures from the original generic description in having short peduncles, being acraspedote and having an inconspicuous genital atrium (Brooks, 1977). Similarly, *Rhabdotobothrium anterophyllum* Campbell, 1975, is described as being acraspedote and having a well-developed genital atrium, contrary to Euzet's (1953) generic description.

Due to variability described in this paper and noted by other workers the following generic emendations are made.

*Genus Rhinebothrium Linton, 1890, Baer, 1948, emended.*—Phyllobothriidae: Scolex with 4 pedicellated bothridia, their adherent surfaces divided by muscular septa, either many transverse septa, or 1 or 2 longitudinal septa in addition to transverse septa, forming loculi; bothridial margin lobulated or entire in form, hinged or not; rostellum absent; peduncle present or absent, spined or not; neck present or absent; scolex may be covered with short spines; strobila craspedote or acraspedote, segments well defined, apolytic; genital pores marginal, irregularly alternating; genital atrium present or absent; vitellaria in lateral bands; testes few to numerous, distributed in median field anterior to cirrus pouch, none between cirrus pouch and ovary on poral side; cirrus pouch conspicuous, cirrus armed; ovary having 2, 4, 6 or 8 lobes in dorsoventral view, X-shaped in cross section; uterus simple, median, tubular; vagina passes immediately anterior to cirrus pouch and opens into genital atrium or genital pore; seminal receptacle present or absent; parasitic in rays (Myliobatoidea) and infrequently in skates (Rajoidea).

Type species: *R. flexile* Linton, 1890.

*Genus Caulobothrium Baer, 1948, emended.*—Phyllobothriidae: Scolex with 4 pedicellated bothridia their adherent surfaces divided by muscular septa, or 1 longitudinal septa in addition to transverse septa, forming loculi; bothridial margins lobulated or entire in form, hinged or not; rostellum absent; posterior portion of scolex always modified into a peduncle; strobila craspedote or acraspedote, apolytic; longitudinal musculature of parenchyma developed or not; genital pores marginal, irregularly alternating; genital atrium present or absent; vitellaria in lateral bands, may connect behind ovary; vitellaria may encroach laterally on medullary parenchyma; testes numerous, distributed in median field sometimes posterior to ovary and always present between cirrus pouch and ovary; cirrus pouch present, cirrus armed or not; ovary X-shaped in cross

section; uterus simple, median, tubular; vagina passes immediately anterior to cirrus pouch and opens into genital atrium or genital pore; parasitic in rays (Myliobatoidea).

Type species: *C. longicolle* (Linton, 1890) Baer, 1948.

*Genus* *Rhabdotobothrium* Euzet, 1953, emended.—Phyllobothriidae: Scolex with 4 pedicellated bothridia, their adherent surfaces divided by muscular septa, either many transverse septa, or 1 longitudinal septa in addition to transverse septa, forming loculi; bothridial margin lobulated or entire in form; rostellum absent; peduncle always absent; neck present or absent; strobila craspedote or acraspedote, apolytic; genital pores marginal, irregularly alternating; genital atrium present or absent; vitellaria in lateral bands; testes numerous, distributed in median field anterior to ovary, and always present between cirrus pouch and ovary; cirrus pouch conspicuous, cirrus armed; ovary bilobed in dorsoventral view, X-shaped in cross section; uterus simple, median, tubular; vagina passes immediately anterior to cirrus pouch and opens into genital atrium or genital pore; parasitic in rays (Myliobatoidea).

Type species: *R. dollfusi* Euzet, 1953.

Recent finding of *Caulobothrium* species with short peduncles (Brooks, 1977, Carvajal, 1977) foreshadows problems in distinguishing this genus from *Rhabdotobothrium*. This possibility becomes more credible in comparing the related genus *Rhinebothrium* where a peduncle can be present or absent, and where, in *R. rhinobati* Dailey and Carvajal, 1976, the peduncle is very short (0.06 mm). It is even disputable whether or not the major distinguishing character of testes distribution between *Rhinebothrium* and *Caulobothrium* compensates for morphological heterogeneity found intragenerically (e.g. *R. ditesticulum* n. sp. vs. *R. urobatidium* n. comb.), and homogeneity found intergenerically (e.g. *R. ditesticulum* n. sp. vs. *C. tetrascaphium* Riser, 1955). While Euzet's (1953) scheme has been useful in temporarily categorizing these three rhinebothriate groups (see also Campbell, 1975), it is possible that future study will not confirm these as natural groupings. It is necessary, therefore, that new descriptions be complete and that generic emendations be made apparent. It is erroneous to state "with characters of the genus" if the species being described differs from the generic evaluation. Whether *Rhinebothrium*, *Caulobothrium* and *Rhabdotobothrium* are actually synonymous or distinct, it is evident that they are in need of revision. It is only through careful descriptions that this task will be made easier.

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#### Literature Cited

- Alexander, C. G. 1963. Tetraphyllidean and Diphyllidean cestodes of New Zealand selachians. Tr. Roy. Soc. N.Z., Zoology, 3(12):117-142.
- Baer, J. G. 1948. Contributions à l'étude de selaciens I-IV. Bull. Soc. Sci. Nat. Neuchatel, 71:63-122.
- . 1961. Aspects ecologiques de la répartition des parasites chez leur hôtes. Wiad. Parazyt., 7:671-686.

- Brooks, D. R. 1977. Six new species of Tetracystidae cestodes, including a new genus, from a marine stingray *Himantura schmardae* (Werner, 1904) from Colombia. Proc. Helm. Soc. Wash., 44(1):51-59.
- , and T. B. Thorson. 1976. Two Tetracystidae cestodes from the freshwater stingray *Potamotrygon magdalenae* Daumeril 1852. (Chondrichthyes: Potamotrygonidae) from Columbia. J. Parasit., 62(6):943-947.
- Campbell, R. A. 1970. Notes on Tetracystidae cestodes from the Atlantic coast of North America, with description of two new species. J. Parasit., 56(3):498-508.
- . 1975. Tetracystidae cestodes from western North Atlantic selachians with descriptions of two new species. J. Parasit., 62(2):265-270.
- Carvajal, J. 1977. Description of the adult and larva of *Caulobothrium myliobatidis* sp. n. (Cestoda: Tetracystidae) from Chile. J. Parasit., 63(1):99-103.
- Cornford, E. M. 1974. Two Tetracystidae cestodes from Hawaiian stingrays. J. Parasit., 60:942-948.
- Dailey, M., and J. Carvajal. 1976. Helminth parasites of *Rhinobatos planiceps* Garman 1880, including two new species of cestodes, with comments on host specificity of the genus *Rhinebothrium* Linton 1890. J. Parasit., 62(6):939-942.
- Euzet, L. 1953. Cestodes Tétracystidés nouveaux ou peu connus de *Dasyatis pastinaca* (L.). Ann. Parasitol. hum. et comp., 28(5-6):339-351.
- . 1954. Parasites de poissons de mer ouest africains récoltés par J. Cadenat. I. Cestodes Tétracystidés de sélaciens (note préliminaire). Bull. de l' I.F.A.N. 16, 1 (série A):126-138.
- . 1959. Recherches sur les cestodes Tétracystidés des selaciens des côtes de France. Thèse Montpellier, 1956. Causse, Graille, Castelnau, Montpellier, 263 pp.
- , and J. Carvajal. 1973. *Rhinebothrium* (Cestoda: Tetracystidae) parasites de Raies du genre *Psammodontus* au Chili. Bull. Mus. Natn. Hist. Nat. Paris, Sec. 3, 131, Zool., 101:779-787 (Published 1974).
- Linton, F. 1890. Notes on Entozoa of marine fishes of New England with descriptions of several new species. Part II. Rep. U.S. Comm. Fish and Fisheries for 1887, Washington, 15:719-899.
- Riser, N. W. 1955. Studies on cestode parasites of sharks and skates. J. Tenn. Acad. Sci. 30(4):265-311.
- Wardle, R. A., and J. A. McLeod. 1952. *The Zoology of Tapeworms*. Univ. Minnesota Press, Minneapolis, Minn., 780 pp.
- Williams, H. H. 1958. Some Tetracystidae (Cestoda) from the Liverpool School of Tropical Medicine. Rev. Suisse de Zool., 65(42):867-878.
- . 1966. The ecology, functional morphology and taxonomy of *Echeneibothrium* Beneden, 1849 (Cestoda: Tetracystidae) and revision of the genus and comments on *Discobothrium* Beneden, 1870, *Pseudanthobothrium* Baer, 1956, and *Phormobothrium* Alexander, 1963. Parasit., 56:227-285.
- Yamaguti, S. 1959. *Systema Helminthum*. Vol. II. Cestodes. Interscience Publ., New York, 860 pp.
- Young, R. T. 1954. Cestodes of sharks and rays in Southern California. Proc. Helm. Soc. Wash., 21:106-112.
- . 1955. Two new species of *Echeneibothrium* from the stingray *Urolophus halleri*. Amer. Micr. Soc., Trans., 74(3):232-234.
- . 1956. A review of the cestode genus *Echeneibothrium*. J. Wash. Acad. Sci., 46(8):256-265.

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